Transcatheter mitral valve replacement with Tendyne™ Device: overview of three-dimensional echocardiography monitoring

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Transcatheter mitral valve replacement with Tendyne™ Device: overview of three-dimensional echocardiography monitoring

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A 77-year-old Caucasian male with post-ischemic dilated cardiomyopathy was referred to our Emergency Department with recurrent acute pulmonary oedema. He reported multiple previous hospitalizations for heart failure, despite maximal tolerated medical therapy.

Echocardiography showed a dilated left ventricle with systolic dysfunction, and severe secondary mitral regurgitation (left ventricle end diastolic volume 135 ml/m²; ejection fraction 25%; EROA 0.42 cm²; regurgitant fraction 53%). These features, together with the above-mentioned clinical history, conferred to the patient a very high surgical risk in the absence of feasibility criteria for percutaneous edge-to-edge mitral valve repair (“proportionate” mitral valve regurgitation with inadequate coaptation length, borderline valve area). Therefore, our local Heart Team suggested a transcatheter mitral valve replacement procedure as an alternative therapeutic option [1].

The Tendyne Mitral Valve System (Tendyne Holdings, LLC, a subsidiary of Abbott Vascular, Roseville, Minnesota, US) consists of a delivery system, an 18 G needle; a 36 french sheath and a D-shaped tri-leaflet porcine pericardial valve supported by a synthetic circular inner frame. The replacement procedure is performed by a trans-apical approach. An alternative hybrid technique for transcatheter mitral valve replacement has been previously adopted with success in a different high-
risk setting such as infective endocarditis in pediatric patients [2].
In this surgical setting, echocardiography plays a paramount role both in procedure planning and in intra-operative monitoring: initially, after having identified the thoracic access, the sheath is inserted rigorously orthogonal to the mitral annulus plane (Figure 1A). Subsequently, the sheath is advanced and stopped 1 cm above the mitral annulus (Figure 1B) and the valve is finally deployed (Figure 1C–D).
A post procedural transoesophageal echocardiography showed correct valve seating with no residual motion of the prosthesis and no left ventricular outflow tract obstruction (Figure 1E–F).
This case underscores the paramount relevance of 3D echocardiographic monitoring in interventional cardiology, in order to achieve the most favorable procedural outcome.

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**Figure 1.** A. Transesophageal echocardiography, biplanar imaging, obtained from inter commissural view showing the tendyne valve partially deployed within the mitral annulus. B. 3D transesophageal echocardiography surgeon’s view, showing sheath positioning (asterisk, showing the part facing LVOT; circle, showing the D-shape of the valve). C. 3D transesophageal echocardiography en face (surgeon’s view). Valve clocking (determining the radial orientation of the valve) should be performed to align the anterior cuff of Tendyne with A2 scallop, along the anterior atrial wall and behind the aortic valve. D. Transesophageal echocardiography, orthogonal biplanar imaging obtained from inter commissural view (left panel) showing correct valve seating with no residual motion of the prosthesis and no LVOT obstruction (right panel: long axis view). E. 3D transesophageal echocardiography en face, surgeon’s view final result. F. 3D transesophageal echocardiography ventricular view showing final result.

Abbreviations: Ao, aorta; LA, left atrium; LAA, left atrial appendage; LV, left ventricle